

PXAO Newsletter Article –

Judging Science Fair Projects for the Arizona Hydrological Society

Eve Halper
March, 2015

I never participated in a science fair growing up, but always wished I had. When I read that the Arizona Hydrological Society was looking for professionals to judge water-related projects at the Southern Arizona Research Science and Engineering Foundation (SARSEF), I volunteered. The competition was held on March 10th at the Tucson Convention Center.

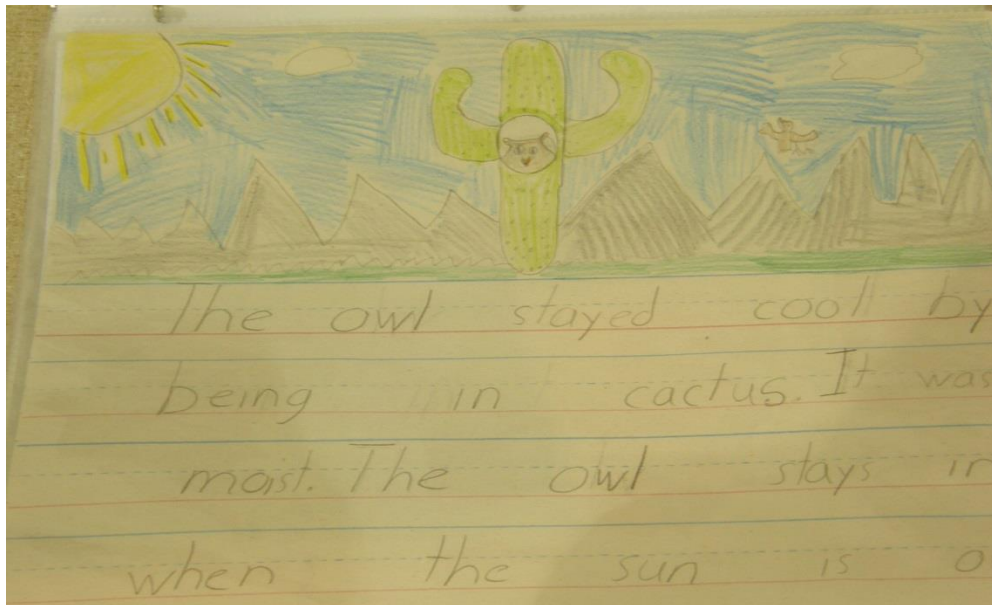
Over 75,000 students throughout Southern Arizona submitted entries. 1,900 projects, by a total of 5,044 students, were selected for judging, and over \$125,000 in prizes were distributed. SARSEF awards “Grand Prizes”, but other organizations with special interests, such as the Arizona Hydrological Society, have “Sponsored Prizes” in targeted categories. These range from non-profits like the Tucson Cactus and Succulent Society and the Arizona Desert Museum, to agencies such as Tucson Water and Pima County Regional Wastewater, to national organizations including Blue Cross Blue Shield, Raytheon, and the Office of Naval Research.

As I looked through the projects, I realized that the topics revealed a lot about water-related issues the public is concerned about, something that we can lose touch with when we spend our days working on highly technical matters. Lower grade projects focused on conservation, rainwater harvesting, water quality and water in the environment. Middle and high school projects also explored the issues of adequate water supplies and desalination technology.

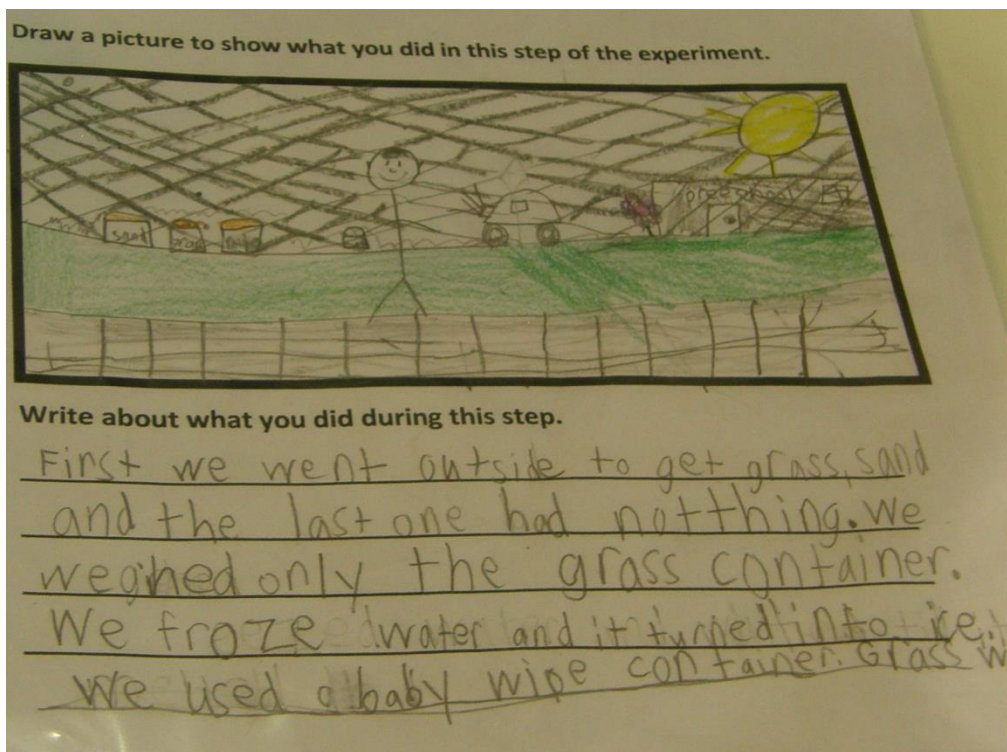
I judged the Kindergarten through 5th grade projects. The other judges were Damian Gosch of HARGIS and Associates, a hydrology consulting firm, and Gail Cordy, a retired USGS hydrologist. Gail spent a few years with Reclamation at the beginning of her career, so some PXAO staff may know her from that era.

The Projects

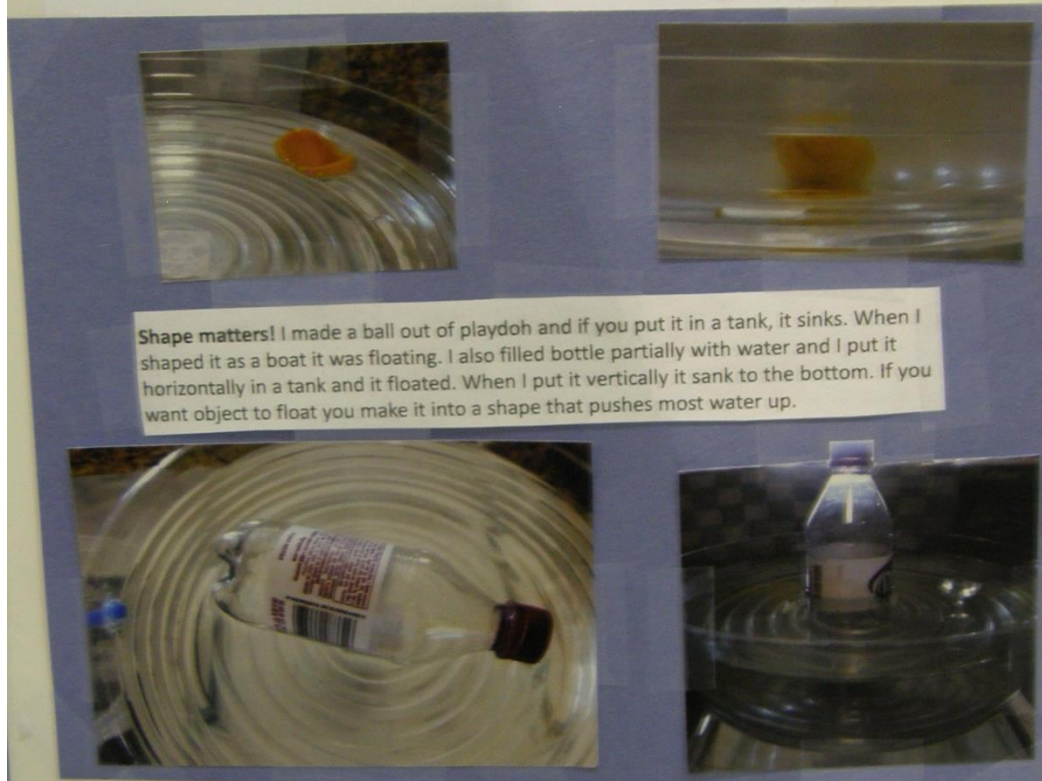
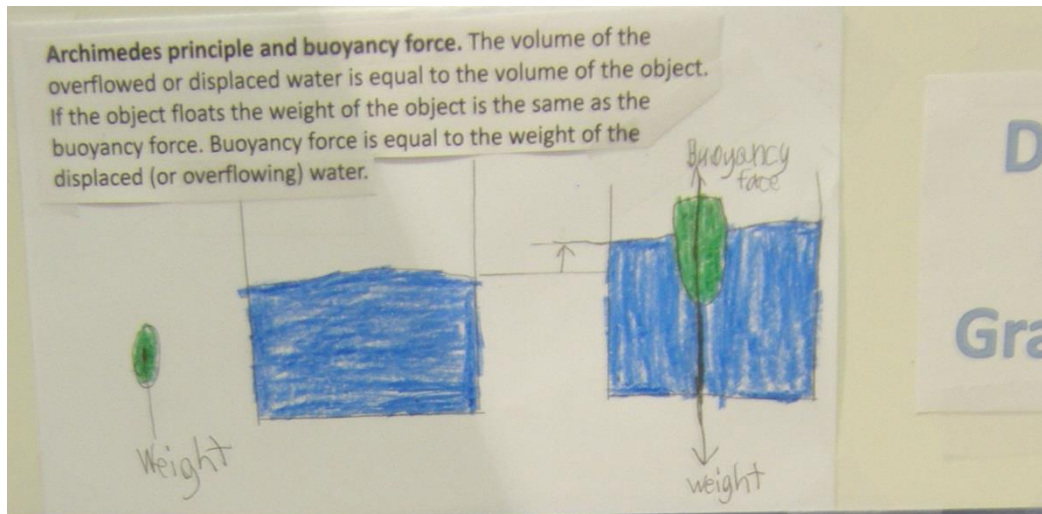
While the technical execution of projects varied by grade level, even projects by the youngest students showed original thinking and creativity. One of the best projects, “Leaf It Cool”, was from a first grade class. Students were asked to write a story and draw a picture about how animals keep cool in the desert. Next they explored the cooling properties of natural materials by measuring how long each one kept ice frozen. Some samples are shown below.



1st Grade winner, "Leaf It Cool" - A picture and story about how owls keep cool in the desert



"Leaf It Cool" - Students described their experiment in words and pictures

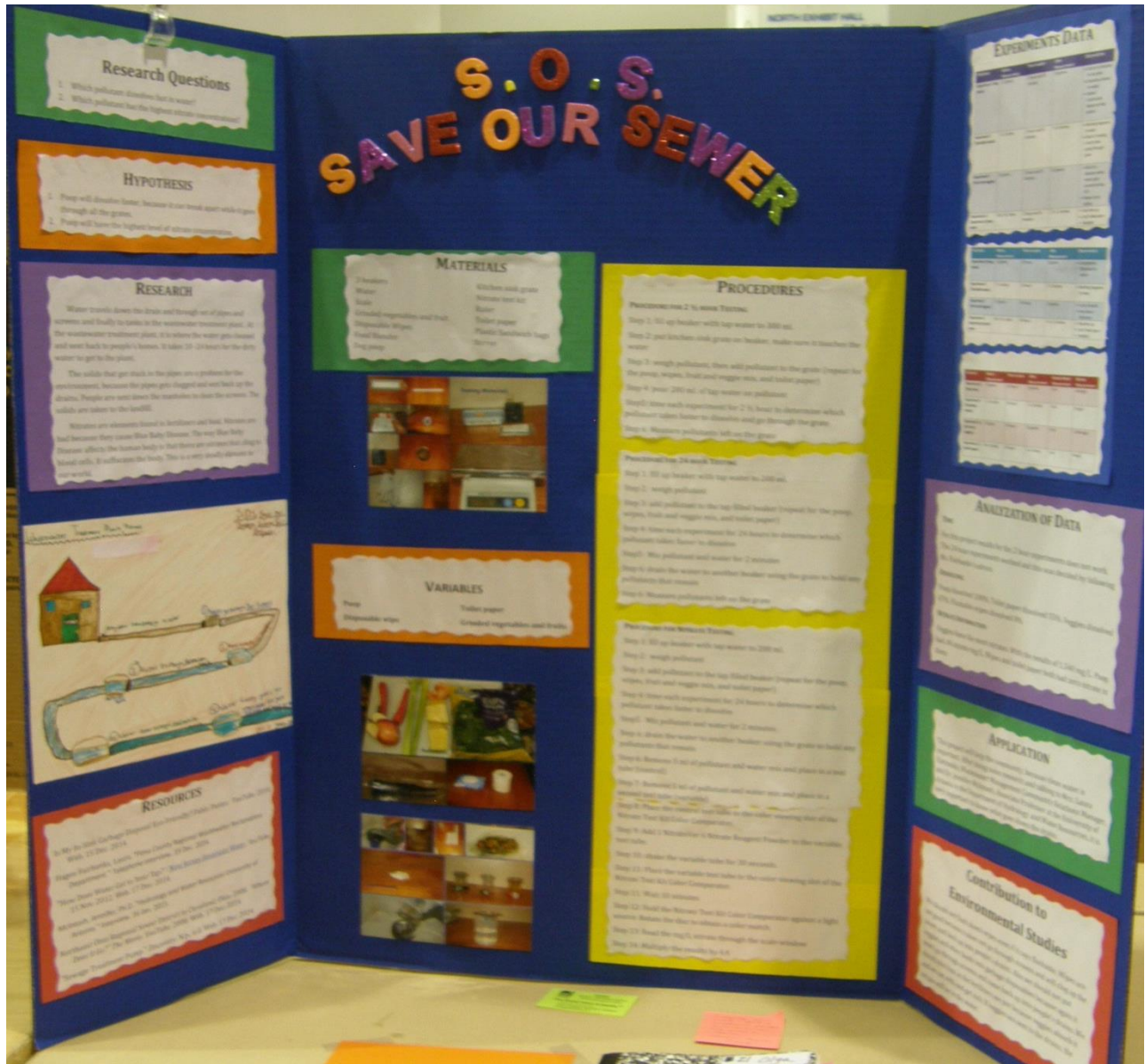


Different materials and their positions in the water determine whether an object floats or sinks.

A second grader performed an impressive experiment about how submarines float or sink. The student came up with the idea after seeing a TV show on submarines and thinking about how they can stay submerged or float. He used simple materials (play dough, a plastic soda bottle, nails) to explore the property of buoyancy. This was a lengthy project, unusual for the lower grades, and was documented extensively with hand-made drawings.

A project on wastewater was created by a fourth grade student who wanted to understand what happened to materials that got flushed in her home. Her background research involved contacting staff from the Pima County Wastewater Department and learning about the wastewater treatment process. Next she designed an experiment to see what was likely to get

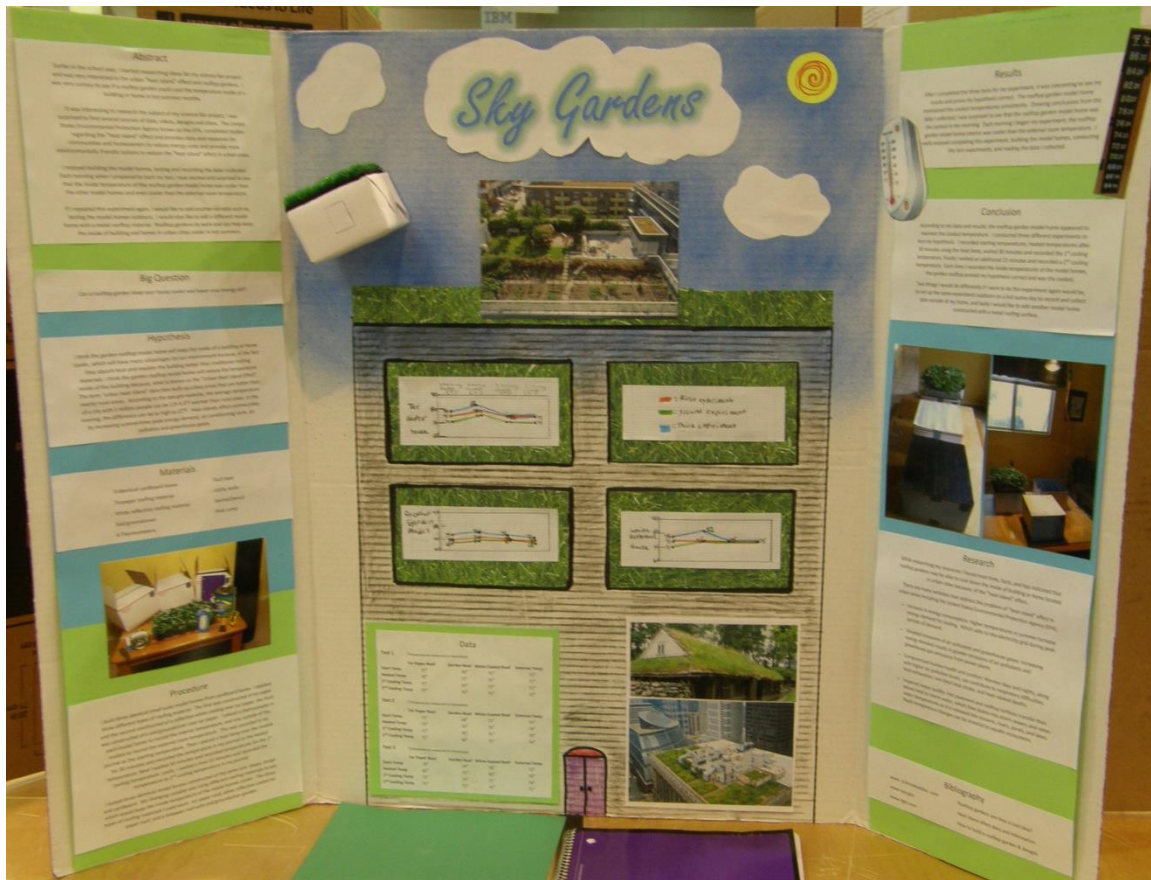
stuck in a sewer pipe, and also tested the nitrate concentrations of these materials. I particularly liked her drawing of the wastewater system.



4th grade prize winner - "Save Our Sewer"

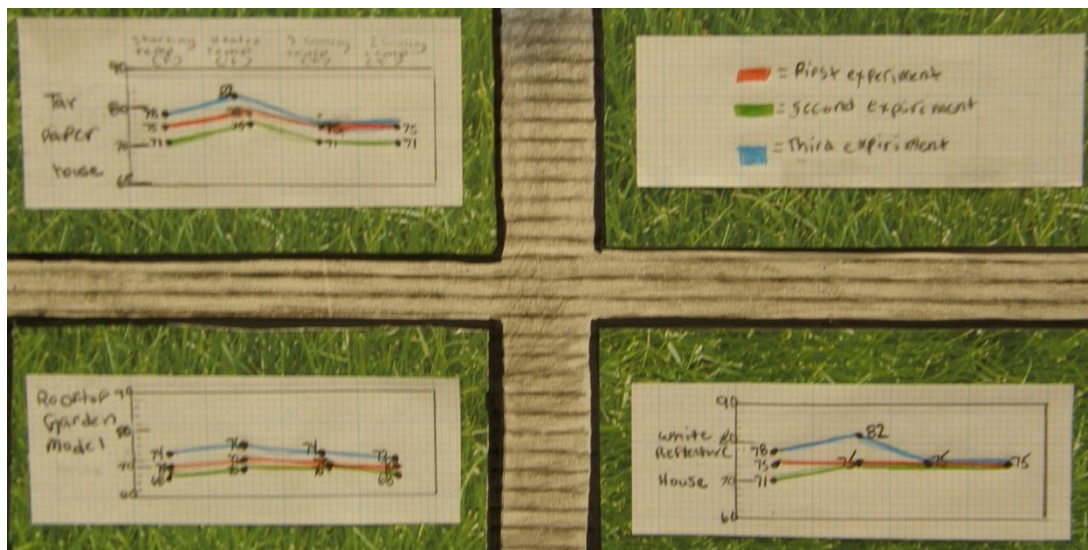
Two fifth grade projects demonstrated great creativity, so I awarded prizes to both of them. (There was no requirement to distribute one prize per grade, apologies to the third graders).

"Sky Gardens", a very topical project on green roofs, garnered second place for the K-5 group. The student had read about green roofs and designed an experiment to test how different types of roof material, including a garden roof, would react in a warming climate.



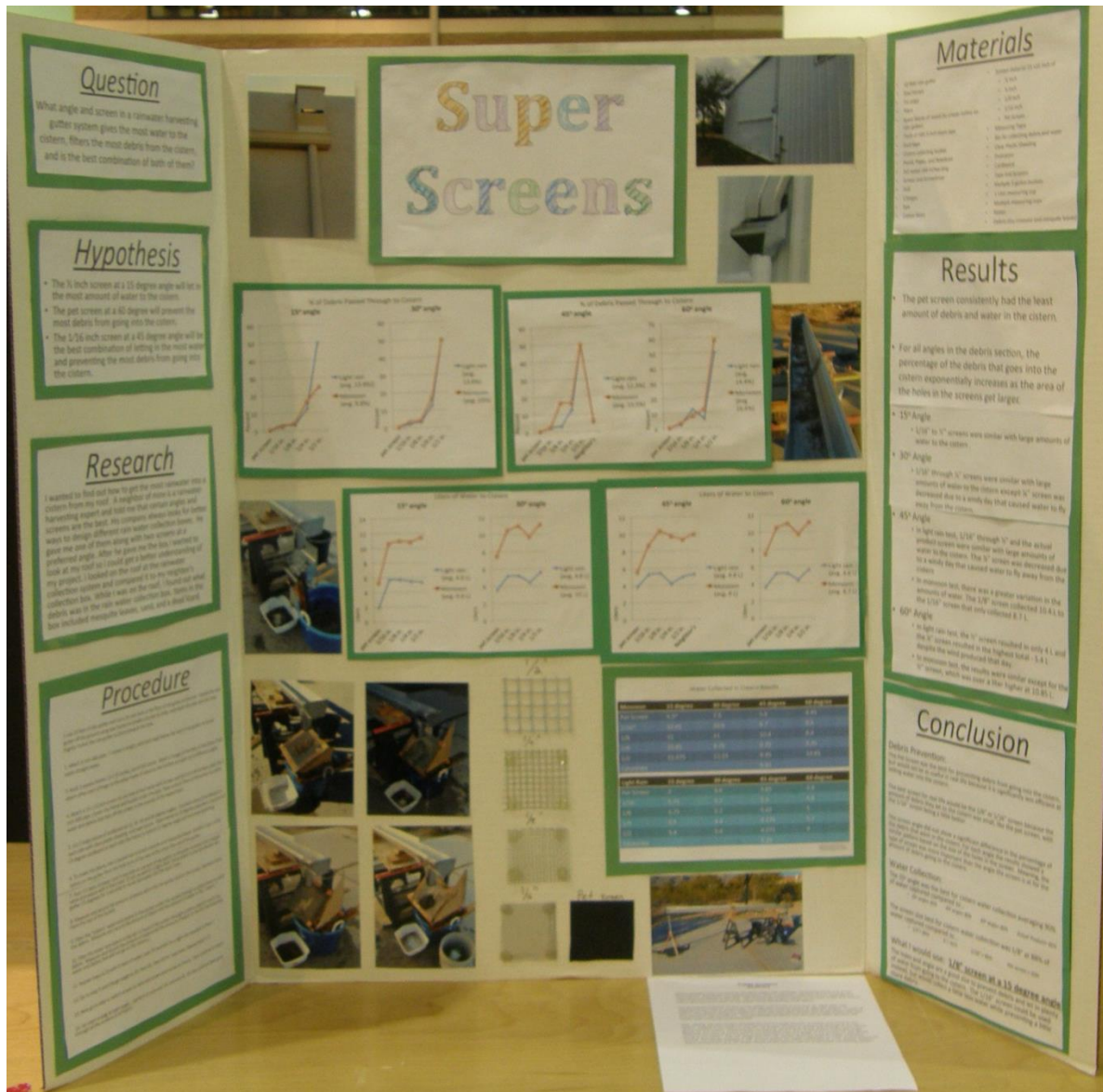
5th Grade Winner, "Sky Gardens", looked at the performance of roof materials under different climate conditions

She constructed mock houses with a white reflective roof, a tar paper roof and a garden roof, and measured their temperatures under different conditions. You can see from the close-up of her data that the garden roof performed very well.

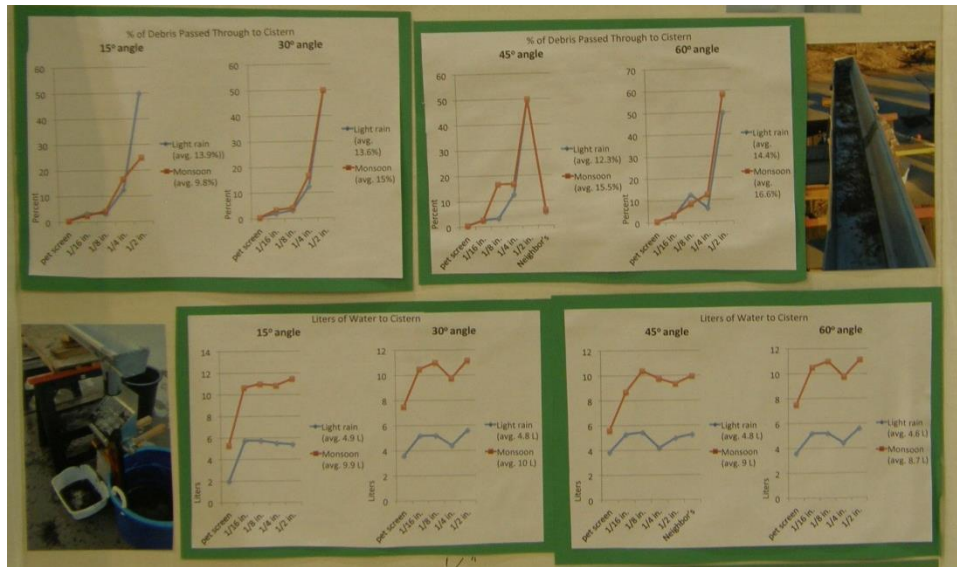


From "Sky Gardens", performance of three roof types under different thermal conditions.

The first prize winner in the K-5 category was entitled, "Super Screens". This project was a rigorous test of the best angle and screen size for removing debris from a rainwater harvesting system. The fifth grader had seen his neighbor's rainwater harvesting system and had talked to him about issues with its operation. This project was a methodically performed experiment with meticulously collected data, analysis and well-reasoned conclusions. I could see these results being used to improve rainwater harvesting systems.



First Prize Winner in K-5 category, "Super Screens"

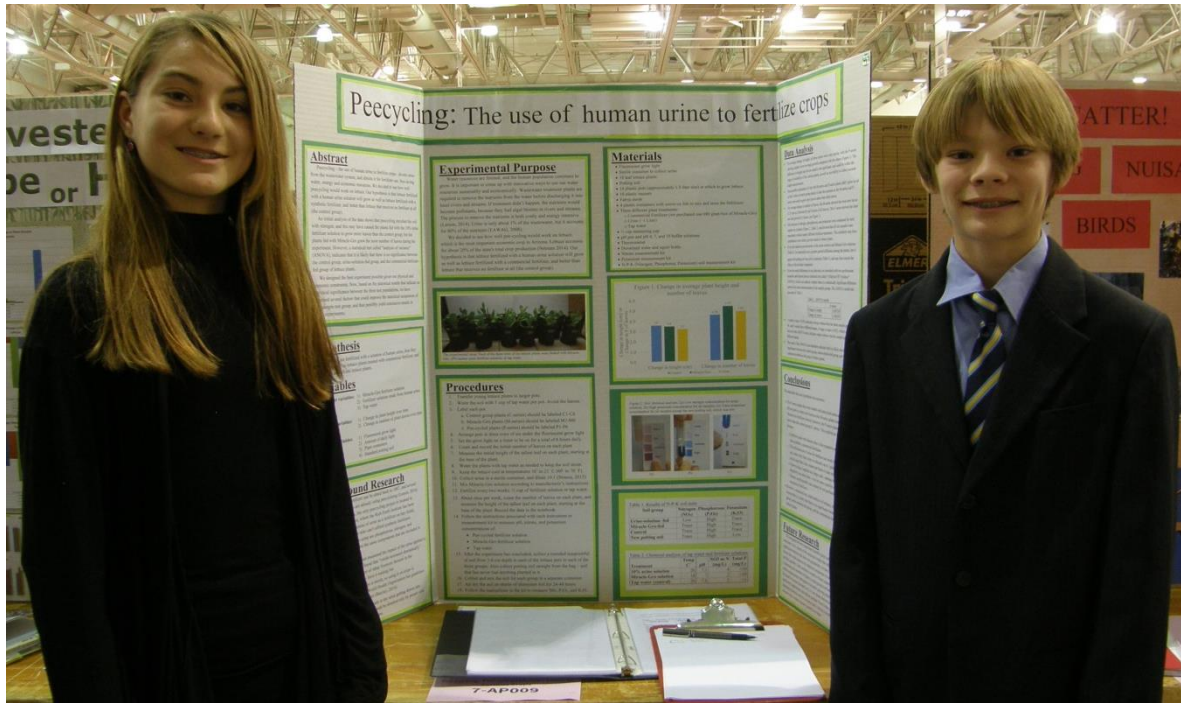


Data Collection for "Super Screens"

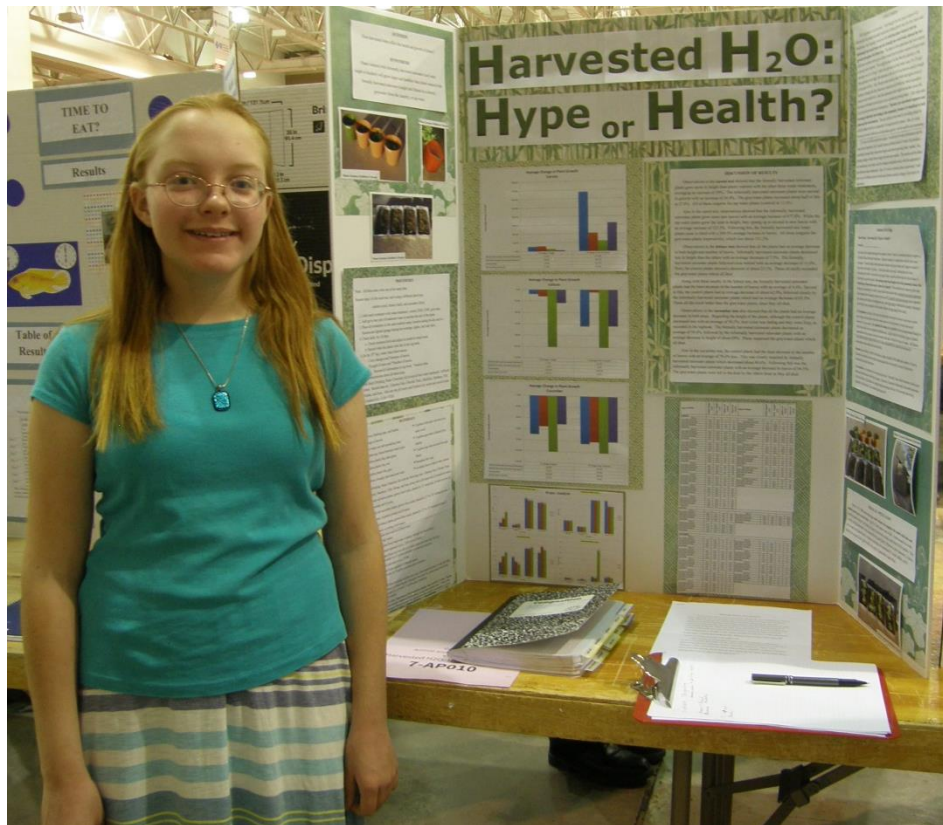
My take-away from this experience is that judging a science fair is a very worthwhile activity, as well as being a lot of fun to see the ideas students come up with. While I think any science project undertaken with a parent or teacher is time well spent, I awarded prizes only to projects where it was clear that the student, not a teacher or parent, had conceived the idea for the experiment.

In the best projects, one could see the progression from the student's area of interest to background research and the development of an experimental framework, followed by careful execution, documentation and analysis. I'm happy to report that there are some outstanding future scientists and engineers with interests in water related fields in Southern Arizona.

While I did not get to meet the recipients of the K-5 prizes, I did get a chance to talk to some of the middle and high school students. Many of them were interested in water issues and were eager to learn more. Below are some pictures of outstanding middle and high-school projects, most with their young creators. Note: permission to include pictures and names was granted by SARSEF.



Grade 7 winners Rachel Whittaker and Robert Leenhouts with "Peecycling - The Use of Human Urine to Fertilize Crops"



Another Grade 7 winner, Rachel Nehmeyer, looked at the quality of harvested rainwater



Grade 8 winner, "Drip, Drench or Drought", a computerized soil moisture probe by Walker Kroubalkian

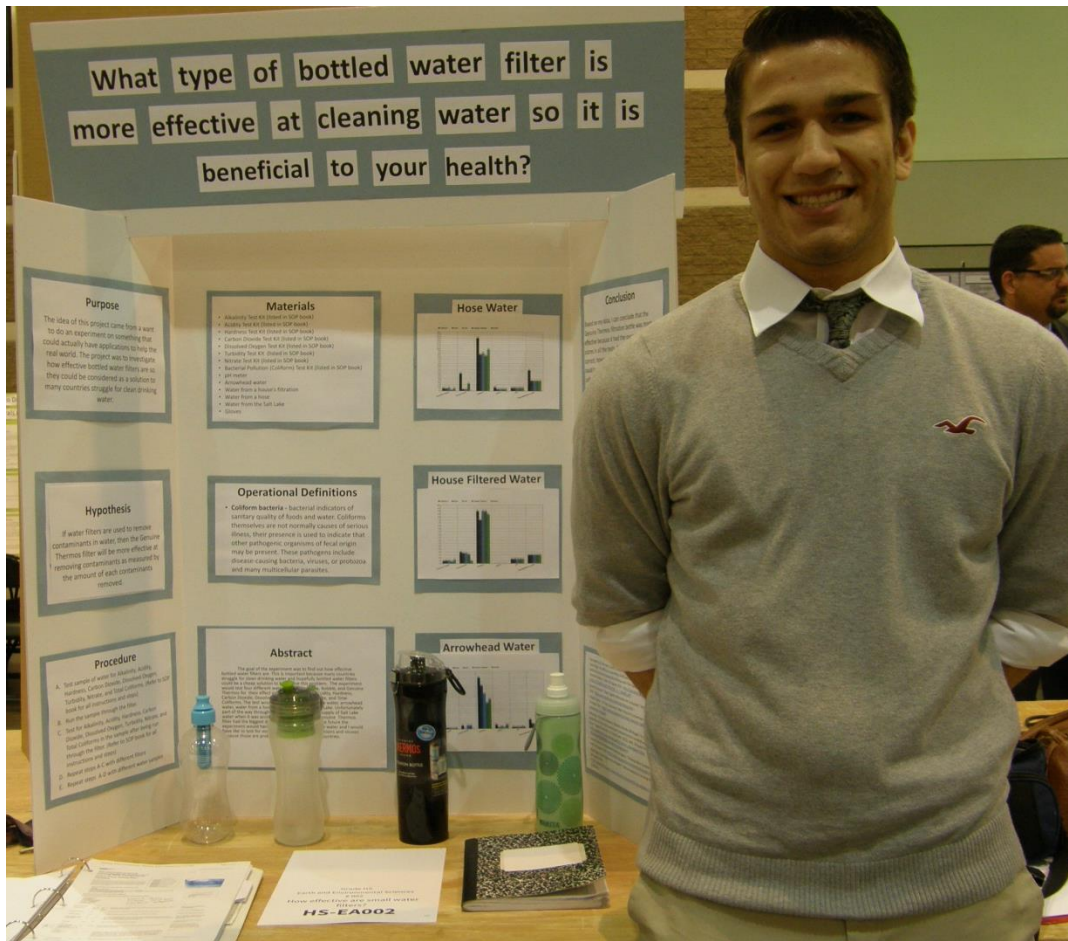


Figure 1 - High School winner Dallas Altamirano with his project on small water filters